Gypsum Drywall Recycling

In the North East

Construction & Demolition Materials
Source Construction & Demolition Recycling Association (CDRA)

- 583 Million tons generated
- 430 million tons recycled
- Diversion success story
- Local markets
- Natural resource savings
- Reducing carbon footprint
- Job creation
- $23.4 Billion economic benefits
Mixed Construction & Demolition Materials

*After subtracting aggregates - source CDRA*

- 63.4 Million Tons Mixed C&D recycled annually
- C&D process fines 21.5 million tons *(Recycling? Diversion? or?)*
- Process fines contain 5-10% sulfate (1-2 m tons)
- Gypsum is 17% Sulfate
- 5.8-11.8 million tons gypsum contained in fines

**Source CDRA**

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U.S. Generates 13.5 Million Tons of Drywall Scraps

NEWMOA States 2.8 million?
Current Disposal Options

- Process fines (ADC?)
- Process residuals
- Truck to landfill
- Rail to landfill

Gypsum & Disposal Challenges

- 8 years landfill capacity in NE
- Gypsum generates H2S (odors)
- H2S Suppresses methane generation
- H2S contaminates methane
- Sulfide contaminates leachate
- Waste to energy ash + So2 emissions
**H2S Issues - Business as usual?**

- 12+ North East landfills currently fighting H2S odor problems
- Class action lawsuits

SC Supreme Court rules nuisance odor is trespassing - tangible invasion $2m award 2013

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**Exporting the Problem?**

- “It is likely that significant quantities of gypsum will be recycled only if gypsum is not allowed in landfills due to H$_2$S issues”  *MA 2007 C&D Debris study*

- “All of the NEWMOA states have experienced public health and/or nuisance problems with hydrogen sulfide gas at landfills that use C&D residuals”  *NEWMOA 2010*

- Hazardous waste definition 40 CFR § 261.23
  
  “...When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment”
Five Steps Outlined by NEWMOA 2010

1. Ban the disposal of gypsum wallboard waste in landfills
2. Require recycling of wallboard wastes produced by state-financed projects
3. Require waste management planning
4. Develop common terminology and reporting requirements
5. Develop and implement extended producer responsibility approaches

Still Talking About This?

- 1973 Asbestos ban
- 1978 Lead paint ban
- 1978 H2S landfill odor linked to gypsum
- 1985 Drywall recycling began due to H2S
- 1990 National Gypsum bankruptcy - asbestos
- 2001 USG bankruptcy - asbestos
- 2005 Drywall Recycling in MA
- 2007 “Gypsum removal should occur prior to processing”.. Control of Odorous Gas at MA Landfills MASS DEP
- 2010 MA new drywall waste ban
- 2015 MA recovered drywall 811 tons (DSM)
- 2019 Landfills continue to battle H2S
Gypsum Supply
USGS 2018

- 21 million MT mined FOB
  Mine $7.80 / ton
- 22 Million Metric Ton FGD
  FOB power plant $5 / ton?
- Price is all about freight

*Flue Gas desulfurization (FGD)*
gypsum is produced by scrubbing sulfur from coal fired power plants.

Gypsum Supply Drivers
Technology, Gas & Trains!

*Coal power 2006-2016*
*Bloomberg*
Gypsum Supply disruption

Gypsum Market Changes 2014 vs 2018

Demand Up 23%

- Consumption 37-48 million mt
- Mined 50% - FGD 50%
- FGD +30%
- Mining +13%
- Imports +31% (5.4 million mt)

Source: USGS
Reclaim Gypsum Market

Source CDRA, UF, USGS

Why Doesn’t It Go There?

*It is only Money!* (Allocation?)

- Cheap Gypsum?
  - New mines built & reopened
  - Stranded FGD wallboard plants
  - New transport facilities built

- Cheap Disposal?
  - New transport facilities built
  - H2S odor abatement
  - Suppressed methane generation
  - H2S gas treatment systems
  - Leachate contamination
  - Legal risk & costs
Who Has The Money?
Drywall Economics

- $0.02 Billion drywall recyclers?
- $3.4 Billion mixed C&D waste
- $60 Billion solid waste
- $10 Billion board products
- $748 Billion building industry

- $0.675 Billion Solves The Problem? (13.5m tons x $50? =0.09% building)

Sources; Me, CDRA, Statista, Gypsum Assn, Statistic-brain

Change is Hard

- Timing is right?
  - Landfill issues & cost
  - Gypsum supply & transportation
  - Public opinion

Gypsum Drywall Recycling Proven Since 1985
Proven in Canada - EU - NW U.S.  
*Including Demolition*

- Ban landfilling
- Drywall abated (source separated)
- Recycling protocol
- Manufacturers take back

*(Ceiling Tile Example in U.S.)*

Successful Programs Ban Gypsum from Landfills and Manufacturers take back

- BC - Bans all gypsum from landfills
- EU - Ban from MSW & CD landfills, no mixing with biodegradable waste. Separate “dry” cell
- Seattle - Ban + permit = 85% of new scrap - 29,000 tons 2013

*Classify as Reactive hazardous waste to provide outlet?*
Extended Producer Responsibility Can the built environment continue to dispose of gypsum without considering public health and welfare?

- Chain of custody
  - Drywall manufacturer
  - Distributor
  - Developer or owner
  - Contractor (waste generator)
  - Waste Hauler
  - C&D Processor / transfer
  - Landfill owner

Drywall Recycling Starts Here
Recycle Planning
Using Construction Documents

- LEED 4.1 waste management plans
- ASTM standard in process
- Life Cycle Analysis (LCA) for waste in process (CDRA)
- Needed - standard construction document examples
- Ordering correct sizes & types
- Permit requirements for recycling
- Certified Process facility certification Recycling Certification Institute (RCI) extra LEED point

Plan & Verify

LEED v4.1 BD+C beta
MR CREDIT: CONSTRUCTION AND DEMOLITION WASTE MANAGEMENT

Cooper Tank Recycling - Cooper Tank Recy
Facility Profile & Report

Facility:

Cooper Tank Recycling
123 Varick Ave.
Brooklyn, NY 11237
Web: coopertankrecycling.com
Contact: Ray Kivlenes
Email: raykivlenes@coopertank.com

Facility Type: C&D Recycling Facility

Correct Facility 12 Month Recycling Rate:
- Recycling Rate with ADC: 69.87%
- Recycling Rate without ADC: 41.39%

Trust but verify
Construction Bid Documents

PART 1 - GENERAL
1.5 ACTION SUBMITTALS
A. Waste Management Plan: Prior to any waste removal, the Contractor shall submit to the owner a Waste Management Plan. The Plan shall contain the following:
   h. Include a narrative and cost estimate for diverting scrap gypsum during construction, not inclusive of scrap gypsum during demolition. Consider processes that minimize labor and loading dock access, such as collecting scrap gypsum in minis that would be tipped into a dedicated packer track when there is a full load, crushed, and then transported to USA Gypsum.

PART 2 - PRODUCTS
2.1 MANUFACTURERS
A. Reclamation Programs: Research and prepare a plan to work with manufacturers who have programs to receive used materials. Known reclamation programs are available from, but not limited to, the following manufacturers:

CONSTRUCTION WASTE MANAGEMENT AND DISPOSAL 017419 - 3

ASTM Standard in Process

Designation: X XXXX-XX

Ballot Rationale
Recycling is currently practiced in the gypsum industry today but is not yet a standardized process. There are many forms of gypsum recycle including scrap gypsum board from construction processes, scrap gypsum board from a manufacturing facility and post-use material that is often the result of building de-construction. The recovery and reuse of all such forms of gypsum is possible and details for such processing are described herein.

Standard Practice for Recycling Gypsum Panel Products
This standard is issued under the fixed designation X XXXX; the number immediately following the designation indicates the year of original adoption or, in the case of revisions, the year of last revision. A number in parentheses indicates the year of last approved. A superscript epsilon (ε) indicates an editorial change since the last revision or approval.

1. Scope
Gypsum Drywall Recycle
Quality Control

Types of Gypsum Drywall

- Demolition concerns
  - Asbestos pre 1980
  - Lead paint
  - Wall covering - paint
  - Contamination levels
  - Landfill facing 10-20%

New

- 100% Recyclable
  - Recovered gypsum core
  - Fiber facing

Demolition
New Gypsum Drywall Types

- New gypsum drywall with standard core including type X fire rated (89%)
- Specialty, green, purple or gold board (11%)?
- Painted or coated
- Anything with color on Facing?
- Research continues

Mixed C&D Processing & Transfer

- Drywall gets crushed & cannot be picked on sort belts
- Requires Positive Sort before processing
- Need space & labor
- Safety Issues
Source Separation of Gypsum Drywall

Increases Recovery Rates
- Space on Jobsite
- Labor management
- Extra transportation?

Source Separation Options
Source Separation Management (trash Control)

Source Separations in Urban Areas
Transportation to Collection Point

Transportation To Collection Point
Consolidation Considerations

- Quality Control
- Expected Volume
- Storage Capacity
- Outside / Inside
- Moisture Cost
- Loading Equipment

Consolidation Options

- Stage containers
- Outdoor bunk (moisture)

Rutland VT 2008
Shipping to Recycler
- Large Dumps
- Walking Floors

Receiving at Recycler
- Dump Trailers
- Flatbeds
- Walking floors
Processing for Quality Products
*USA Gypsum today*

*USA Gypsum 1998*

Raw Material & Process Enclosed

*moisture and dust control*

- Gypsum drywall stockpile
- Process machinery
USA Gypsum Markets
Economics require upcycling

- Farm
- Home
- Industrial
- Package options
- Several grades
- Custom Blending
- Buy on line

Gypsum Drywall Recycling Resources
Standards the industry can agree upon?

- EU PAS 109 Specification 2009 updated 2013
- NEWMOA 2010 “Strategies to Increase Recycling of Waste Gypsum Wallboard in the Northeast”
- CDRA 2018 “Standard Specification for the Production of Recycled Gypsum from Scrap Gypsum Drywall”
Stakeholders - All of Us

“The years just pass like trains, I wave but they don’t slow down”
...Steve Wilson on twitter

Reading Captain Envirotoron to my granddaughters